

APPENDIX A: AN INTRODUCTION TO STREAM ECOLOGY

ECOLOGY: the study of organisms in relation to their environment.

STREAM: a body of water moving in a more or less definite pattern through the path of least resistance to a lower elevation.

ECOSYSTEM: basic unit of ecology, an interacting system.

Running water ecosystems are hard to generalize about, varying from fast flowing, cold, headwater mountain brooks to slow moving, weedy, warm, large lowland rivers.

*****Streams are products of their watersheds! *****

STREAM HABITATS COMPARED TO POND HABITATS

	Rivers and Streams	Lakes and Ponds
Energy Sources	External	Internal
Stratification	Headwaters to Mouth	Shoreline to Offshore
Current	Major factor: gravity	Minor factor: winds
Water Conditions	Changeable but uniform	Stable but stratified

Current speed is a major determinant of stream substrates and aquatic communities.

LAND-WATER INTERFACE

Streams are intimately connected with the surrounding land. A healthy stream is a result of a healthy watershed.

TEMPERATURE

Cold water streams - max. temperatures less than 70F, i.e. trout streams

Warm water streams - higher temperatures, i.e. bass, catfish, pickerel

OXYGEN

Streams are generally well oxygenated, at or near saturation. Stream fish are adapted for high oxygen levels.

POOLS AND RIFFLES

Pools - areas of slow moving deep areas with fine substrates.

Pools serve as cover and resting areas.

Riffles - areas of fast moving, shallow areas with coarser substrates.

Riffles serve as food production and feeding areas.

COVER

Cover is very important to stream fish. Cover in the form of boulders and woody debris also offers attachment surfaces for invertebrates.

STREAM HABITATS INFLUENCE THE BIOLOGICAL COMMUNITY COMPOSITION.

STREAM ORGANISMS ADAPTATIONS TO RUNNING WATER.

- 1) Permanent attachment
- 2) hooks, suckers, adhesive surfaces
- 3) streamlined bodies
- 4) flattened bodies
- 5) orient into current

Energy Flow in streams

Much of the energy that drives the stream ecosystem is from outside the stream. Energy is in the form of organic matter such as leaves, twigs, etc.

This energy is harvested by groups of invertebrates (i.e. mayflies, stoneflies, caddisflies) called collectors or shredders.

These invertebrates are then fed on by small fish species such as shiners and young stages of other fish species.

Larger predatory fish then feed upon these smaller fish.

Large predator fish can then be harvested by man or serve as dinner for other predators such as kingfishers, mink, otters or turtles.

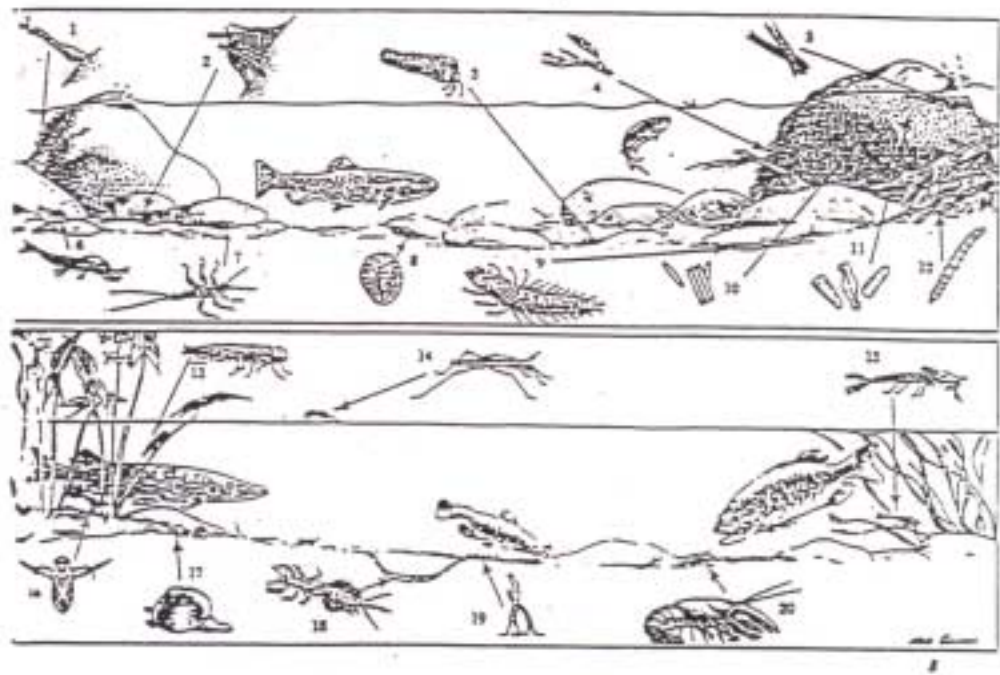


Figure 10-5. Life in a fast stream compared to that in a slow stream. (1) Blackfly larva; (2) net-spinning caddisfly; (3) stone case caddisfly; (4) water moss (*Fontinalis*); (5) alga *Ulothrix*; (6) mayfly nymph (*Isonychia*); (7) stonefly nymph (*Perla*); (8) water penny; (9) hellgrammit; (10) diatoms (*Diatoma*); (11) diatoms (*Gomphonema*); (12) crane fly larva; (13) dragonfly nymph; (14) waterstrider; (15) damselfly nymph; (16) water boatman; (17) fingernail clam (*Sphaerium*); (18) burrowing mayfly nymph (*Hexagenia*); (19) bloodworm; (20) crayfish. The fish in the fast stream, above, are (left) brook trout, (right) redbelly dace. The fish in the slow stream, below, are (left to right) northern pike, bullhead, and smallmouth bass.